Deep brain stimulation for movement disorders

Deep Brain Stimulation (DBS) is a surgical procedure which is done for the treatment of movement disorders like Parkinson's Disease (PD), essential tremors and dystonias. In this procedure electrodes are placed in specific targets located deep within the brain and chronic stimulation results in resolution of the movement disorder. The exact mechanism is not known however it may act by inhibiting the output from the target nuclei. Several mechanisms have been hypothesized to explain the inhibitory effects of high frequency stimulation, like inactivation of voltage gated channels, depolarization block and stimulation of the afferent inhibitory (GABAergic) terminals in the target nucleus resulting in release of Gama Amino Butyric Acid (GABA) and inhibition. The common targets for DBS for movement disorders are the Subthalamic Nucleus (STN), Globus Pallidus interna (GPI) and Ventral Intermediate Nucleus of the Thalamus (Vim).

The indications for DBS have recently been extended to psychiatric disorders like obsessive Compulsive Disorder (OCD), medically refractory depression, Tourette's syndrome, alcohol and drug addiction etc. DBS has also been used to treat medically refractory epilepsy, morbid obesity, disorders of consciousness and Alzheimer's disease. DBS has been most widely used to treat Parkinson's disease and long term follow up data is now available to assess the efficacy of this procedure. DBS has shown to improve the motor symptoms of PD like tremors, rigidity and hypokinesia in the immediate and long term follow up. It is very effective in patients with drug induced dyskinesias and decreases the Levodopa dose required. Long term favorable outcomes have also been reported for tremors and dystonia. The procedure involves placement of electrodes with the help of advanced imaging techniques, stereotactic guidance, intraoperative microelectrode recordings and intra-operative stimulation. The electrodes are connected to an Implantable Pulse Generator (IPG) and chronic high frequency continuous stimulation is done adjusting the parameters-stimulation strength (Voltage) frequency (Hertz) and pulse width (Microsecond). Complications of DBS are related to the procedure (Infection, hemorrhage etc.), stimulation related and hardware related. The advances in DBS include newer electrodes, longer lasting rechargeable battery, newer stimulation techniques (like adaptive stimulation), advances in neuroimaging and intra-operative MRI to target the deep nuclei.

Biography

Rahul Lath did his undergraduate Medicine and Postgraduate neurosurgical training from CMC Hospital Vellore following which he worked as a fellow in Neurosurgery at the Flinders Medical Centre in Adelaide, Australia. He is now working as a Senior Consultant Neurosurgeon at the Apollo Hospitals, Hyderabad. He has established Functional Neurosurgery and Radiosurgery at the Apollo Hospitals Hyderabad. Apart from this his special interests include stereotactic neurosurgery, minimally invasive spine surgery, vascular neurosurgery and micro-neurosurgery of brain tumors. He has publications in various national and international peer reviewed journals in Neurosurgery. He is an active member of the Neurological Society of India (NSI), Indian Society of Stereotactic and Functional Neurosurgery (ISSFN), Asian-Australasian Society for Stereotactic and Functional Neurosurgery (AASSFN) and the Congress of Neurological Surgeons (CNS). He is involved in the training program for DNB Neurosurgery candidates.